

Mississippi and Missouri valleys, where, in August, they occur less frequently than in either of the two preceding months. They have been most numerous along the Atlantic and east Gulf coasts, and from the records of the stations where they have occurred most frequently it is shown that such rainfalls may not be expected to occur during August in any portion of the districts named at shorter intervals than three or four years; many stations show that they occur with less frequency, and at a few of some of the older established stations no such monthly rainfalls have ever been recorded in August. The following are some of the remarkable monthly rainfalls shown by the August records: Fort Barrancas, Fla., 30.73, 1878, and 25.07, 1879; Maurepas, La., 23.44, 1888; New Orleans, La., 22.74, 1888; Charlestown, Ill., 23.04, 1882; Ellsworth, N. C., 28.33, 1880. The fall of 12.08 inches at Fort Verde, Ariz., in 1876, though much less than that for many of the stations mentioned is not less remarkable, as such a fall is very unusual for that part of the country. On the north Pacific coast the largest August rainfall was that of 5.49, at Tatoosh Island, in 1884; in California, the largest was 1.95, at San Diego, in 1873.

Daily rainfalls amounting to, or exceeding, 2.50 inches in the month of August have seldom occurred west of the one hundredth meridian; between that meridian and the Mississippi River, and also in the Lake region, they occur with much less frequency than in other districts to the eastward. The southern New England and New Jersey coasts and the south Atlantic and east Gulf states have been most commonly subjected to excessive daily rainfalls, the stations reporting the greatest number showing an average of about one for each period of two years. From records at stations on Pensacola Bay, Fla., it appears that that vicinity has been more fre-

quently subjected to excessive daily rainfalls than any other part of the United States. During 1879, 1880, and 1881 daily rainfalls exceeding 2.50 inches occurred at Fort Barrancas ten times in August, and at Pensacola similar rainfalls occurred eight times from 1881 to 1888. The following are some of the largest daily falls on the records of the Signal Service: 10.38, Griffin, Ga., 8th, 1883; 9.75, Fort Barrancas, Fla., 29th, 1878; 9.56, Savannah, Ga., 5-6th, 1872; 9.14, Hatteras, N. C., 23d, 1880; 9.00, Ellsworth, N. C., 4th, 1880.

Hourly rainfalls of 1.00 inch or more have occurred with decidedly less frequency in August than in the preceding month. In August they have been most numerous in the central valleys, and in the Atlantic coast and Gulf states, but there are numerous stations in these districts showing no such rainfalls. A record covering about half a century at Saint Louis shows that in that vicinity hourly rainfalls reaching this limit have occurred in August about once in four years, and while some stations with short records show a higher rate of frequency the records in general indicate that but few localities have been subjected to these falls more frequently than is represented by the Saint Louis records. Some of the most remarkable are as follows:

Station.	Year.	Date.	Actual fall.	Duration.	Rate per hour.
			Inches.	h. m.	Inches.
Saint Louis, Mo	1848	15	5.05	0 15	20.20
Norfolk, Va	1888	20	2.48	0 10	14.88
Providence, R. I.	1878	6	3.50	0 30	5.83
Osage, Iowa	1881	26	1.40	0 15	5.60
Jacksonville, Fla.	1873	20	3.72	0 40	5.88
Auburn, N. H.	1877	27	3.00	0 35	5.16
New Brunswick, N. J.	1887	2	4.50	1 00	4.50
Aiken, S. C.	1878	14	4.00	1 00	4.00

WINDS.

The most frequent directions of the wind during August, 1888, are shown on chart ii by arrows flying with the wind. They were westerly and southwesterly in the Lake Region and New England; from southeast to southwest on the south Atlantic coast, and in the Gulf States; mostly from west on the Pacific coast, and variable in other districts.

HIGH WINDS (in miles per hour).

No maximum velocity of fifty, or more, miles per hour, other than those given in the table of miscellaneous meteorological data, are reported, except at Mount Washington, N. H., 90, nw., 10th; 88, nw, on 15th and 25th; 96, w., 27th; 87, w., 28th; 103, nw., 29th; and at Fort Bridger, Wyo., 50, sw., 18th.

LOCAL STORMS.

1st. Missouri.—Saint Louis: the thunder-storm which occurred between 4.15 and 5.18 p. m. was accompanied by high winds, which reached a maximum velocity of fifty-one miles per hour; considerable damage was done to trees, fences, etc.

1st-2d. Minnesota.—Saint Cloud, Stearns Co.: a remarkably severe storm prevailed during the night. The roads in the surrounding country were badly washed, and much damage was done by lightning.

2d. Minnesota.—Duluth: very heavy rain began at 8.15 p. m. and ended during the night; the damage done by washouts in this city and vicinity is estimated at \$10,000.

3d. Kansas.—Topeka: during the thunder-storm which occurred in the evening the wind attained a velocity of sixty miles per hour. Abilene, Dickinson Co.: between this place and Hope a large number of buildings were blown down by the storm which occurred during the evening. **Wisconsin.**—La Crosse: a very severe thunder-storm, accompanied by high wind and heavy rain, prevailed between 1.46 and 4.30 a. m. The electrical display during the storm was very remarkable.

4th. Dakota.—Huron, Beadle Co.: two destructive hailstorms occurred during the afternoon, the first about 3.30, and

moved in a northeasterly direction; the second, at 6 p. m., moved first to the southeastward and then eastward. Several barns and small houses were destroyed by the last-mentioned storm. At Huron there was heavy rain and large hail, accompanied by thunder and lightning, in the afternoon, the wind blowing at the rate of forty-five miles per hour, and proving very destructive. Concerning the storm in the vicinity of Huron the "Daily Huronite" of the 6th states:

The loss in the immediate neighborhood of Huron amounts to but little, but through a strip of country six or seven miles south, thence extending east and north, the damage is great. Through six or seven townships in this county the crops are badly beaten down. The storm seems to have skipped about in a peculiar manner, not by any means destroying all in its course, but taking some crops entirely, damaging some, and leaving many almost unhurt.

Severe and destructive hail-storms also occurred in Kingsbury and Moody counties. At Spring Lake, Kingsbury Co., about 5.30 p. m. a tornado did much damage to buildings and crops. **Iowa.**—The "Dysart (Iowa) Reporter" states that a very destructive hail-storm occurred in Grundy and Tama counties about dusk. Within the path of the storm, which was about five miles in width and twenty miles in length, crops were completely ruined, and many houses damaged. **Kansas.**—Dodge City: during a thunder-storm between 6.15 and 7 p. m. the wind suddenly increased in velocity from fourteen to sixty miles. Considerable damage is reported to have been done by the storm at Spearville, twenty miles east of Dodge City.

Michigan.—Detroit: a thunder-storm, accompanied by high wind and heavy rain, occurred during the night; much damage was done by the flooding of basements; the local papers report the loss from the storm at \$30,000. Hail of unusual size fell two miles northeast of station during the storm. **North Carolina.**—Marion, McDowell Co.: a severe local storm, accompanied by hail, visited this place in the afternoon; a large warehouse was completely demolished and several other buildings were damaged.